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كلمة عميد كلية العلوم بمناسبة يوم البحث العلمي الثاني عشر

بسم الله الرحمن الرحيم

الحمد لله رب العالمين، والصلاة والسلام على أشرف الأنبياء والمرسلين.

تواصل كلية العلوم بجامعة الملك فيصل جهودها في ترسيخ بيئة بحثية متقدمة، تقوم على دعم جودة المخرجات العلمية وتعزيز الابتكار، بما ينسجم مع التوجهات الاستراتيجية للجامعة ومستهدفات رؤية المملكة 2030.

ويأتي انعقاد يوم البحث العلمي الثاني عشر تأكيدًا لالتزام الكلية بدعم الحراك البحثي، وإبراز ما تحقق من منجزات علمية نوعية لمنسوبيها من أعضاء هيئة التدريس والباحثين والطلبة، حيث تمثل هذه الفعالية منصة علمية لعرض أبرز الأبحاث المنشورة في المجلات المصنفة عالميًا، إلى جانب الابتكارات وبراءات الاختراع، بما يعكس تطور الأداء البحثي وتكامله داخل الكلية.

كما يشكل التقرير السنوي للنشر العلمي أداة استراتيجية لتقييم الأداء وتوجيه الخطط المستقبلية نحو تعظيم الأثر العلمي وتعزيز كفاءة الإنتاج البحثي، بما يسهم في تحقيق أولويات الجامعة التنموية .

وختامًا، تتقدم الكلية بالشكر لرئيس الجامعة على دعمه المستمر، ولسعادة وكيل الجامعة للدراسات العليا والبحث العلمي، ولجميع منسوبيها على جهودهم العلمية، سائلين الله التوفيق لمواصلة مسيرة التميز.

والله ولي التوفيق،،،

عميد كلية العلوم

د.عبدالمحسن بن إبراهيم القفاري

يوم البحث العلمي الثاني عشر بكلية العلوم

مقدمة

تعتبر كلية العلوم من الكليات الرائدة والمتميزة على مستوى الجامعة فيما يتعلق بالنشر العلمي والنشاط البحثي، حيث تسعى الكلية وتبذل كافة الجهود في تشجيع الباحثين وتحثهم على النشر العلمي مع التركيز على جودة ورصانة الأبحاث والمنتجات العلمية.

ويأتي في طور اهتمام الكلية بالعملية البحثية أن تعقد فعالية سنوية للاحتفال بالبحث العلمي بحضور ورعاية كريمة من معالي رئيس الجامعة حيث تتشرف الكلية وكافة منسوبيها بحضوره لا سيما أن معاليه هو الداعم الأكبر لهذه الإنجازات.

تحتفل كلية العلوم في هذا العام 2026م الموافق 11-11-1447 بانعقاد يوم البحث العلمي في دورته السنوية الثانية عشر. حيث يتم افتتاح معرض علمي يمكن من خلاله لزوار الكلية الاطلاع على كافة الأنشطة البحثية والعلمية للمناقشة مع الباحثين والطلبة ويستمر المعرض لمدة ثلاثة أيام.

يشتمل المعرض على العديد من الملصقات العلمية لأهم الأوراق البحثية التي نشرت في مجلات تصنيفها Q1 خلال عام 2025م والتي حصلت على أعلى معامل تأثير وترتبط مباشرتا بهوية الجامعة، وكذلك براءات الاختراع المتحصلة. كذلك يشارك طلبة الدراسات العليا والبكالوريوس بأهم أعمالهم ومنجزاتهم العلمية.

احصائية النشر العلمي:

تقوم وكالة الكلية للدراسات العليا والبحث العلمي مع نهاية كل عام ميلادي وتزامنا مع انعقاد فعالية يوم البحث العلمي بإعداد تقرير متكامل عن الإنتاج العلمي والأنشطة البحثية لمنسوبي وباحثي الكلية.

يعتبر تقرير النشر العلمي السنوي ذو أهمية عالية حيث تستند عليه إدارة الكلية والاقسام في رسم خططها البحثية السنوية للعمل بشكل مكثف في تطوير العمل البحثي لتعظيم نقاط القوة وتلافي نقاط الضعف وذلك للمساهمة في تحقيق رؤية ورسالة الجامعة والتي تهدف لتحقيق مستهدفات رؤية المملكة 2030.

يشتمل التقرير على احصائيات وأرقام شاملة للإنتاج العلمي والأنشطة البحثية كأعداد الأوراق العلمية المنشورة وتصنيفها وعدد الاستشهادات وبراءات الاختراع ومعدلات النشر لأعضاء هيئة التدريس وحضور المؤتمرات العلمية والانشطة البحثية لطلبة الكلية.

The 12th Annual Scientific Research Day at the College of Science

The College of Science is considered one of the leading and distinguished colleges at the university level in terms of scientific publishing and research activity. The college strives to encourage researchers and motivate them to publish their scientific work, emphasizing the quality and rigor of their research and scientific products.

As part of the college's commitment to the research process, it holds an annual event to celebrate scientific research, under the generous patronage of His Excellency the University President. The college and all its members are honored by his presence, especially since His Excellency is the greatest supporter of these achievements.

This year, 2026 (corresponding to 11-11-1447 AH), the College of Science celebrates its 12th annual Scientific Research Day. A scientific exhibition will be held, allowing visitors to explore all the college's research and scientific activities and engage in discussions with researchers and students. The exhibition will continue for three days.

The exhibition includes numerous scientific posters showcasing the most important research papers published in Q1-ranked journals during 2025, which have achieved the highest impact factors and are directly linked to the university's identity, as well as patents obtained. Graduate and undergraduate students also participate, presenting their most significant scientific work and achievements.

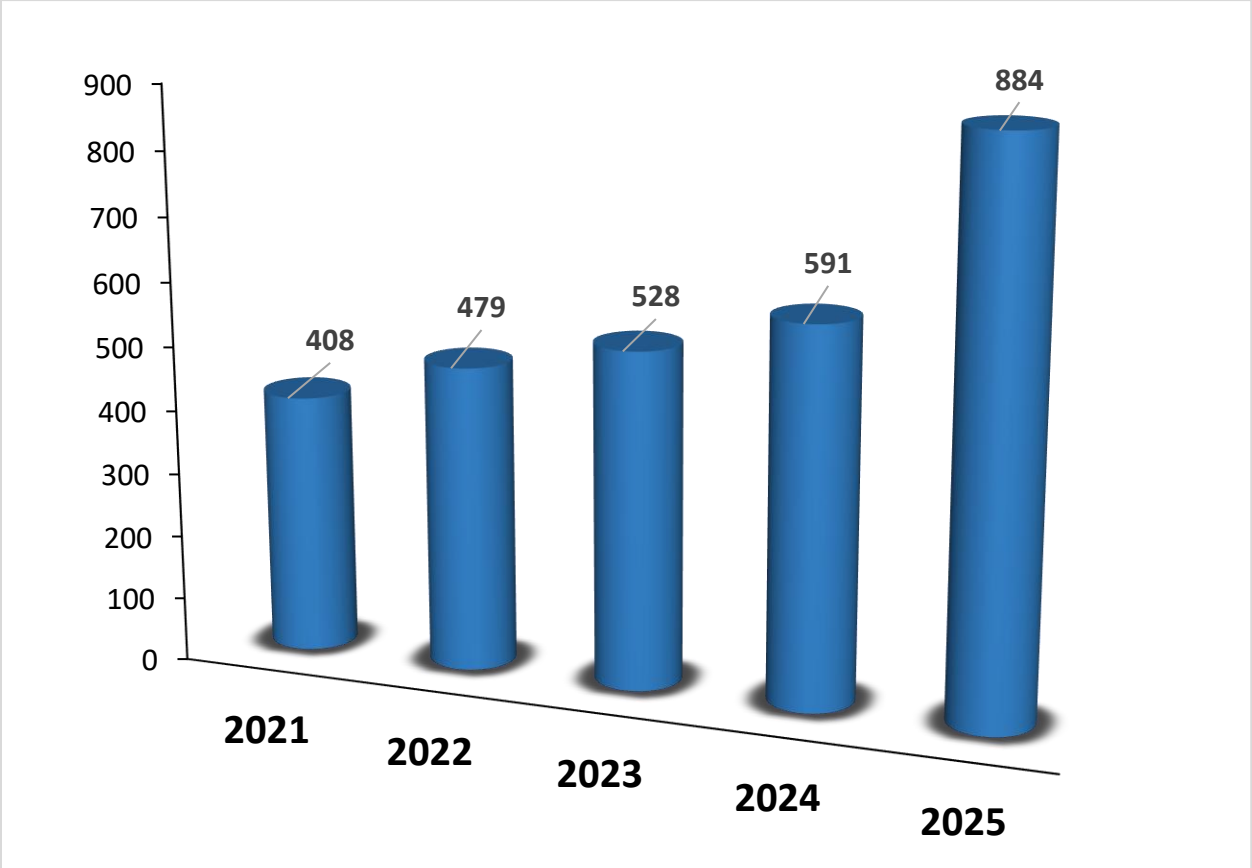
Scientific Publication Statistics:

At the end of each calendar year, coinciding with the Scientific Research Day event, the College's Agency for Graduate Studies and Scientific Research prepares a comprehensive report on the scientific output and research activities of the college's faculty and researchers.

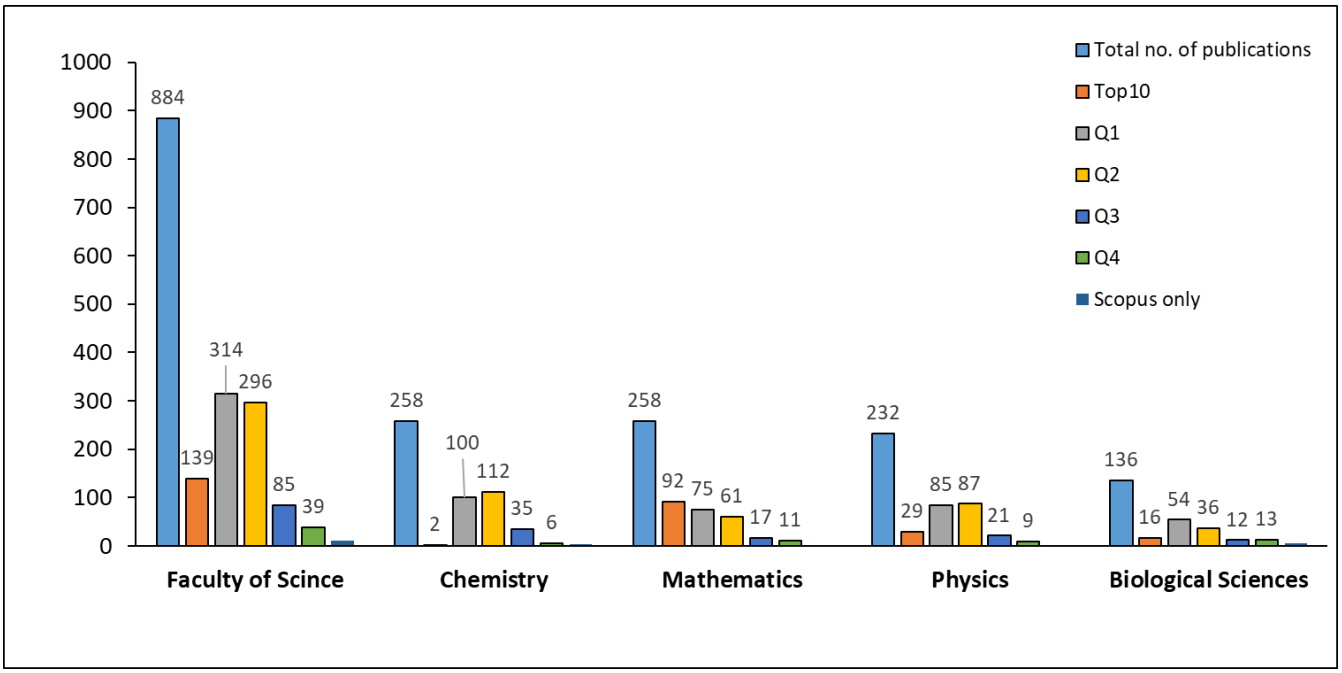
The annual scientific publication report is of paramount importance, as the college administration and departments rely on it to formulate their annual research plans. This allows them to work intensively on developing research activities, maximizing strengths and addressing weaknesses, thereby contributing to the realization of the university's vision and mission, which aligns with the goals of the Kingdom's Vision 2030.

The report includes comprehensive statistics and figures on scientific output and research activities, such as the number and classification of published scientific papers, the number of citations, patents, faculty publication rates, attendance at scientific conferences, and student research activities.

الزيادة في عدد الابحاث المنشورة خلال عام 2025

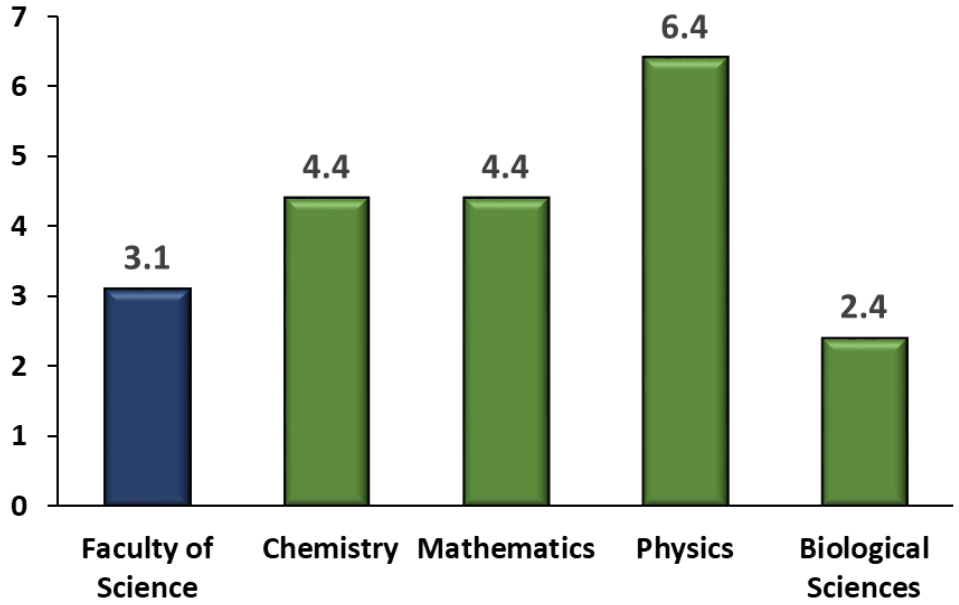


تصنيف الابحاث المنشورة خلال عام 2025

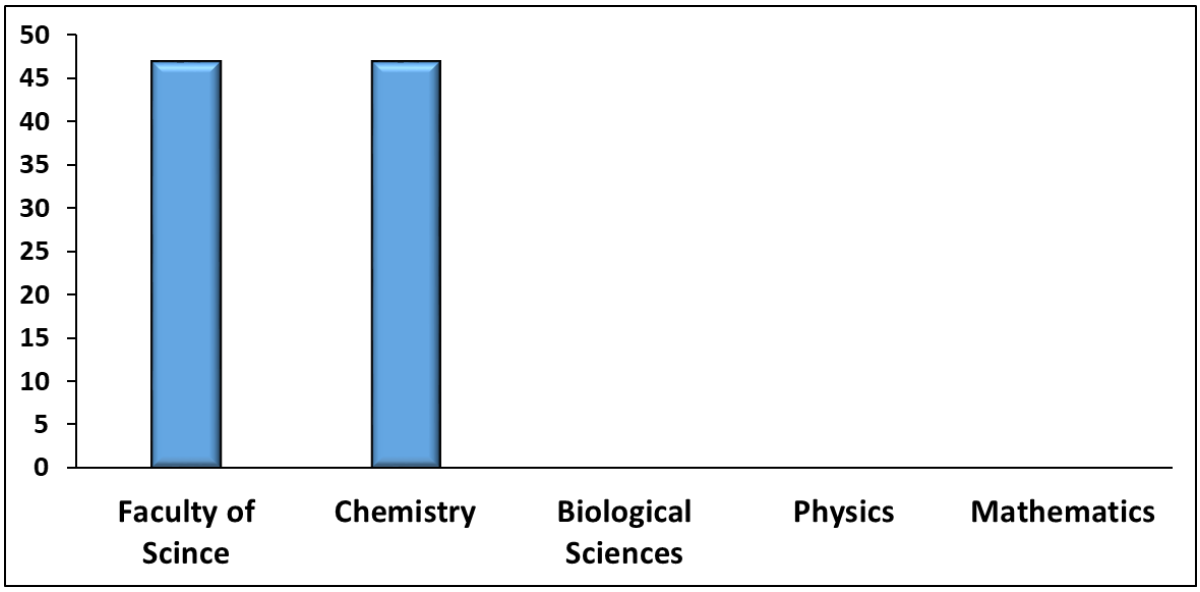


معدل النشر العلمي لأعضاء هيئة التدريس بالأقسام والكلية

	No. of faculty members	Total number of articles	Articles/ Faculty member
Faculty of Science	211	884	3.1
Chemistry	59	258	4.4
Mathematics	59	258	4.4
Physics	36	232	6.4
Biological Sciences	57	136	2.4



براءات الاختراع الممنوحة خلال العام 2025



رسائل الماجستير والأبحاث المستلة منها

Scopus only	Q4	Q3	Q2	Q1	Total no. of publications from thesis	Total no. of thesis	القسم
0	0	0	4	4	8	7	الكيمياء
0	2	0	2	0	4	4	علوم الحياة
0	0	0	1	5	6	3	الرياضيات والاحصاء
0	0	0	1	1	2	3	الفيزياء
0	**2**	**0**	**8**	**9**	**19**	**17**	كلية العلوم

ملخص ملصقات قسم علوم الحياة

Title: Foliar spraying with zinc oxide nanoparticles enhances the anti-osteoporotic efficacy of the fruit extracts of Silybum marianum L. by stimulating silybin production
Journal: Front Plant Sci, 2025 Jan 7:15:1421485.
Authors: Bedoor Fahad Almulhim , Fadia El Sherif , Nancy S Younis , Yamen Safwat , Salah Khattab

Abstract

Introduction: Silybum marianum is a medicinal plant that produces silymarin, which has been demonstrated to possess antiviral, anti-neurodegenerative, and anticancer activities. Silybin (A+B) are two major hepatoprotective flavonolignans produced predominantly in S. marianum fruits. Several attempts have been made to increase the synthesis of silymarin, or its primary components, silybin (A+B). Zinc oxide nanoparticles (ZnO-NPs) are considered a highly efficient Zn source widely used to promote crop development and productivity.

Methods: In this study, we aimed to investigate the effects of the foliar application of ZnO-NPs on the growth, yield, photosynthetic pigment content, silybin (A+B) content, and the expression of the chalcone synthase (CHS) gene in S. marianum plants. Different concentrations of ZnO-NPs were administered as foliar sprays to S. marianum plants growing in greenhouse conditions. Furthermore, we evaluated the anti-osteoporotic efficacy of the corresponding fruit extract against dexamethasone (Dex)-induced osteoporosis.

Results and discussion: Foliar treatment at all ZnO-NP concentrations increased the amounts of bioactive components of silybin (A+B), which enhanced the growth and yield of S. marianum plants while increasing the levels of N, P, K, and Zn in their leaves, roots, and fruits; the levels of photosynthetic pigments in their leaves; and silybin (A+B) content in their fruits, thereby increasing the medicinal value of S. marianum. The highest gains were observed in plants sprayed with the highest ZnO-NP concentration (20.0 mg/L). In addition, gene expression studies revealed that ZnO-NPs stimulated silybin (A+B) production by activating CHS genes. The administration of S. marianum extracts to Dex-administered rats increased osteoblast and bone formation while inhibiting osteoclast and bone resorption, thereby protecting the animals against Dex-induced osteoporosis.

Title: Exploring the Diversity of Some Microorganisms from Lake Al-Asfar, KSA: The Good, the Bad, and the Pathogenic
Journal: Diversity 2025, 17(1), 37
Authors : Fatimah Al Tammar ,Nermin El Semary , ORCID,Munirah . Aldayel, Duaa Althumairy and Gowhara Alfayad

Abstract

Background: Lake Al-Asfar in KSA was used as a sink for wastewater for decades and suffered from pollution. The lake is a habitat to different microbial species that play important ecological roles, some of which are good, and some are bad and even pathogenic. In a previous investigation, algal-bacteria consortia have proven to be beneficial in bioremediating heavy metals and hydrocarbons in Lake Al-Asfar. The identity of algae was revealed to be Chlorella sp. and Geitlernema sp. in the consortia. The identity of the heterotrophic bacterial partners, on the other hand, awaits investigation and is addressed in the present research. On the other hand, investigating the diversity of Protozoa and parasites is also tackled as they represent indicators of pollution. Some pose serious health risks, but some of them also contribute to reducing some of the pollution levels. Methods: Bacteria associated with algae were isolated in pure form. The polyphasic approach was used to identify bacterial samples, including staining procedures, the use of Vitek technology, and scanning electron microscopy. This information was integrated with structure information such as capsule presence, endospore formation, and wall characteristics indicated by Gram stain. With regard to protists including Protozoa and parasites, Light microscopy and taxonomic books of identification were used to reveal their identity. Results: three main bacterial strains belonging to the following genera were identified: Sphingomonas, Rhizobium, and Enterbacter. The last is potentially pathogenic and poses health risks to Lake goers. Rhizobium, on the other hand, is most likely found in the lake from agricultural wastewater and is a nitrogen fixer that increases the fertility of crops. The first bacterium is associated with special lipid metabolism and is hardly pathogenic. Several diverse microscopic forms of protists, mainly Protozoa and parasites, were identified, which included Entamoeba histolytica, Balantidium coli, Ascaris lumbricoides, Amoeba, Paramecium, Euglena, and Gymnodinium sp. Discussion: The three types of bacteria identified have metabolic activities that are associated with bioremediation. On the other hand, protists, including Protozoa and parasites, are regular members of wastewater communities and help in scavenging solid wastes, but they cause hazards such as

secreting toxins, causing disease, and impacting the bioremediation potential by feeding on beneficial bioremediating algae and bacteria. This is part of the wastewater ecosystem dynamics, but efforts must be exerted to minimize, if not completely eliminate, pathogenic parasites in order to maximize the growth of algal consortia. Conclusions: Vitek technology is an emerging less time- and effort-consuming fast technology for identifying bacteria. Bacteria identified have significant ecological bioremediating roles, together with their algal partners, but some pose pathogenic risks. Identifying co-inhabitants like protists and parasites helps to shed light on their impact on one another and pave the way for restoration efforts that minimize the biological hazards and maximize the use of beneficial local microorganisms.

Title: 2-Amino-3-Chlorobenzoic Acid from Streptomyces coelicolor: A Cancer Antagonist Targeting PI3K/AKT Markers via miRNA Modulation
Journal: Pharmaceuticals (Basel), 2025 Apr 24;18(5):620.
Authors: Ashraf Khalifa , Joseph D Balthazar , Pandurangan Subash-Babu , Mohamed Y Zaky

Abstract

Background/Objectives: Actinomycetes, particularly species within the Streptomyces genus, are renowned for their ability to produce a wide array of bioactive molecules with therapeutic potential. This study aimed to comprehensively investigate the antimicrobial and anticancer properties of Streptomyces coelicolor ERI-15, with a particular focus on a purified compound, 2-amino-3-chlorobenzoic acid (2A3CB), and its efficacy against microbial pathogens and breast cancer cell lines. Methods: Antimicrobial compounds were produced through fermentation techniques and isolated via column chromatography. Bioassay-guided fractionation was conducted against Staphylococcus aureus (ATCC 25923), methicillin-resistant Staphylococcus aureus (MRSA), Escherichia coli (ATCC 25922), and Bacillus subtilis (ATCC 441). Major fractions were further purified using preparative thin-layer chromatography (TLC). The structures of active compounds were elucidated using spectral analyses including IR, mass spectrometry, and 1H/13C NMR. The compound 2A3CB (m/z 171) was tested against MDA-MB-231 and 3T3 cell lines. Cytotoxicity was assessed by the MTT assay, and apoptotic mechanisms were explored via cell proliferation assays, dual fluorescent staining, migration and invasion assays, and analysis of apoptotic markers at mRNA and protein levels. Results: 2A3CB exhibited strong cytotoxic effects on MDA-MB-231 cells, with IC50 values of 26 µM, 5 µM, and 7.2 µM at 24, 48, and 72 h, respectively. It significantly inhibited cell proliferation and migration, and induced apoptosis via caspase-mediated pathways. Expression levels of PTEN, PCNA, BAX, and STAT3 were downregulated, suggesting inhibition of metastasis through the suppression of invasion and migration. Conclusions: The results demonstrate that 2A3CB, derived from S. coelicolor ERI-15, possesses potent antimicrobial and anticancer properties. Its ability to inhibit growth and induce apoptosis in MDA-MB-231 breast cancer cells highlights its potential as a natural therapeutic candidate for targeted cancer treatment, particularly in breast cancer progression.

Title: "5,7,4'-trimethoxyflavanone from Bauhinia variegata exerts anti-inflammatory and protective actions in LPS-challenged rat intestine"
Journal: Sci Rep, 2025 Nov 28;15(1):42731.
Authors : Peramaiyan Rajendran , Balasubramanian Rajkapoor , Maryam N AlNasser , Gamal M Bekhet , Ramya Sekar , Lalitha Keddal Govindaram , Faten Abdullah Alrashaid

Abstract

This study aimed to investigate the protective effects of 5,7,4'-trimethoxyflavanone (TMF), a bioactive compound isolated from Bauhinia variegata Linn., on lipopolysaccharide (LPS)-induced intestinal injury in rats. Chronic intestinal inflammation was induced by repeated LPS administration, and the therapeutic potential of TMF in alleviating the associated damage was assessed. Male rats were subjected to chronic intestinal inflammation via repeated intraperitoneal administration of LPS at a dose of 1 mg/kg body weight once daily for 4 weeks. Simultaneously, the test group received daily oral administration of TMF at 75 mg/kg body weight from day one after 4 weeks of induction of intestinal inflammation until the end of the experiment. Histopathological examination of the intestines, along with biochemical assays for inflammatory markers, oxidative stress, and tissue integrity, were performed to evaluate the protective effects of TMF. Comparisons between the LPS-treated control group and the TMF-treated group were made to assess the reductions in inflammation and intestinal injury. TMF therapy diminished LPS-induced Nuclear Factor kappa B(NF-κB) activation and inhibited the levels of TNF-α, IL-6, and IL-1β, thereby reducing oxidative stress. These data indicate that TMF provides protective effects by regulating critical inflammatory and oxidative processes associated with LPS-induced intestinal damage. In conclusion, TMF from B. variegata has been demonstrated to be a potential therapeutic agent for mitigating intestinal inflammation and oxidative damage, suggesting a natural method for addressing inflammation-induced gut lesions. Additional research is necessary to investigate its clinical applicability in inflammatory bowel disease and other gastrointestinal conditions.

Title: Dual-sensitive gelatin-coated chitosan microparticles for targeted semaglutide pulmonary delivery: a novel approach to enhancing anti-inflammatory and anti-fibrotic effects

Journal: International Immunopharmacology, November 2025, Volume 165, 14

Authors: Rabab S. Hamad , Ahmed Y. Kira, Sameh Saber, Mariam S. Alharbi, Hamad Alsaykhan, Elsayed A. Elmorsy

Abstract

This study introduces a novel dual-sensitive drug delivery system, gelatin-coated chitosan microparticles (GL-ChMPs), designed to enhance the lung targeting and therapeutic efficacy of semaglutide (SEM). GL-ChMPs were designed to respond to the acidic environment and metalloproteinases, conditions that are typical in pulmonary fibrosis. SEM-GL-ChMPs exhibited superior lung targeting and prolonged retention while minimizing systemic distribution. SEM-GL-ChMPs demonstrated 21-fold and 2-fold higher time-averaged lung drug exposure compared to free SEM solution and uncoated ChMPs, respectively. In a bleomycin-induced chronic lung injury model, SEM-GL-ChMPs effectively attenuated inflammation and fibrotic progression in lung tissues. On the inflammatory front, SEM-GL-ChMPs significantly reduced immune cell infiltration, which was accompanied by lower BALF total protein and LDH, suggesting reduced alveolar-capillary barrier disruption and cellular injury. At the molecular level, there was a marked inhibition of TLR4/NFκB signaling and a downregulation of pro-inflammatory cytokines TNF-α, IL-6, and IL-8. On the fibrotic side, SEM-GL-ChMPs resulted in a pronounced decrease in key fibrogenic mediators, including TGF-β1 and p-SMAD3, and critical markers like α-SMA and Col1a1. Histopathological analysis further reinforced these findings. The gelatin coating was designed to exploit MMP-2 overexpression in fibrotic lungs, enabling localized drug release. Our data confirmed that metalloproteinases are positively correlated with fibrosis progression, supporting the rationale for this enzyme-responsive delivery approach. Collectively, SEM-GL-ChMPs not only improved lung-specific drug delivery and retention but also effectively mitigated the hallmarks of chronic lung injury at cellular, molecular, and tissue levels. This underscores their promise as a precision-targeted, dual-sensitive platform for managing chronic inflammatory and fibrotic lung diseases.

Title: Exploring physiological and molecular dynamics of drought stress responses in plants: challenges and future directions
Journal: Front Plant Sci. 2025 Mar 24;16:1565635.
Authors: Sajad Ali, Rakeeb Ahmad Mir, Md Azizul Haque , Zahoor Ahmad Mir

Abstract

Plants face multifactorial environmental stressors mainly due to global warming and climate change which affect their growth, metabolism, and productivity. Among them, is drought stress which alters intracellular water relations, photosynthesis, ion homeostasis and elevates reactive oxygen species which eventually reduce their growth and yields. In addition, drought alters soil physicochemical properties and beneficial microbiota which are critical for plant survival. Recent reports have shown that climate change is increasing the occurrence and intensity of drought in many regions of the world, which has become a primary concern in crop productivity, ecophysiology and food security. To develop ideas and strategies for protecting plants against the harmful effects of drought stress and meeting the future food demand under climatic calamities an in-depth understanding of molecular regulatory pathways governing plant stress responses is imperative. In parallel, more research is needed to understand how drought changes the features of soil, particularly microbiomes, as microorganisms can withstand drought stress faster than plants, which could assist them to recover. In this review we first discuss the effect of drought stress on plants, soil physicochemical properties and microbiomes. How drought stress affects plant microbe interactions and other microbe-driven beneficial traits was also highlighted. Next, we focused on how plants sense drought and undergo biochemical reprogramming from root to shoot to regulate diverse adaptive traits. For instance, the role of calcium (Ca^{2+}), reactive oxygen species (ROS) and abscisic acid (ABA) in modulating different cellular responses like stomata functioning, osmotic adjustment, and other adaptive traits. We also provide an update on the role of different hormones in drought signaling and their crosstalk which allows plants to fine tune their responses during drought stress. Further, we discussed how recurrent drought exposure leads to the development of short-term memory in plants that allows them to survive future drought stresses. Lastly, we discussed the application of omics and biotechnological-based mitigating approaches to combat drought stress in sustainable agriculture. This review offers a deeper understanding of multiple factors that are related to drought stress in plants which can be useful for drought improvement programs.

ملخص ملصقات قسم الكيمياء

Title: Eco-Friendly Carbohydrate Nanocomposites of Amino Cellulose and MWCNTs for High-Performance Corrosion Protection of Construction Steel Alloys

Journal: Construction and Building Materials, Volume 475, 16 May 2025, 141219

Authors: Hany M. Abd El-Lateef, Mohammed A.O. Basubaih, Mohamed Gouda

Abstract

This study reports the synthesis and characterization of novel multi-walled carbon nanotube (MWCNT)-amino cellulose composites with enhanced electrochemical and physicochemical properties. Cellulose derivatives (ACEL-1 and ACEL-2) were functionalized with β-amino alcohols and integrated with acid-treated MWCNTs. Structural and electrochemical analyses confirmed a strong synergy between the components, leading to superior corrosion inhibition of C-steel, achieving up to 98.67 % efficiency. The inhibition mechanism was attributed to adsorption, chemical bonding, and the physical barrier effect of MWCNTs. Density functional theory (DFT) and molecular dynamics simulations further supported the strong interaction and stability of the composites on Fe surfaces. Surface analysis using SEM measurements confirmed the adsorption of inhibitors on the metal surface, demonstrating their protective effect against corrosion. These findings highlight the potential of MWCNT-amino cellulose composites for multifunctional applications, including corrosion protection and advanced cellulose material development.

Title: Simazine inclusion complexes with cucurbiturils (n = 6–8): experimental and molecular dynamics studies

Journal: Scientific Reports 2025, 16

Authors: Abdalla A. Elbashir, Maali Saad Mokhtar, FakhrEldin O. Suliman & Amel Y.Ahmed

Abstract:

Simazine (SIM) inclusion complexes with cucurbit[n]uril, CBn, (n = 6–8), have been studied in both aqueous solutions and solid states. NMR measurements were taken in DMSO. The solid samples were examined using Fourier transform infrared spectroscopy (FTIR) and powder X-ray diffraction (PXRD). Molecular dynamics (MD) simulations were used to investigate the inclusion process at an atomic level and to examine the mechanism and stability of the complexes. The results showed that the SIM complexes with both CB[7] and CB [8] are highly stable in water, whereas the smaller cavity of CB[6] prevents the formation of an inclusion complex with SIM. The findings clearly demonstrate that, in addition to hydrophobic interactions, hydrogen bonding plays a significant role in stabilizing these complexes.

Title: High efficiency reduction of 4-nitrophenol on greenly synthesized gold nanoparticles decorated on chitosan matrix (CS-GLA/AuNPs)

Journal: Scientific Reports, 2025, 15

Authors: Amel Taha & Norah Alsadun

Abstract:

An inexpensive bioinspired green approach using Saussurea costus root extract was developed to fabricate CS-GLA/AuNP catalyst for the reduction of 4-nitrophenol (4-NP) to 4-aminophenol (4-AP). Chitosan beads (CS) supported Au nanoparticles have been modified to improve their mechanical and thermal stability, using Glutaraldehyde (GLA). The modified chitosan beads (CS-GLA) and CS-GLA/AuNPs were investigated using FTIR, SEM, and TEM techniques. The diameter of AuNPs decorated chitosan beads was found to be around 6.0 ± 3 nm. The X-ray diffraction technique confirmed the crystalline nature of (CS-GLA/AuNPs) and AuNPs decorated chitosan beads. The TGA analysis showed that loading of AuNPs on the chitosan matrix increases its thermal stability. The synthesized (CS-GLA/AuNPs) catalysts exhibited excellent activity in reducing 4-nitrophenol to 4-aminophenol, compared to pure AuNPs and chitosan beads (CS-GLA/AuNPs), enabling the conversion of 4-nitrophenol in 30 minutes with 1 mg of the catalyst. The kinetic study indicated that the reduction of 4-nitrophenol on the CS-GLA/AuNPs catalyst follows the pseudo-first-order model. Moreover, the CS-GLA/AuNPs catalyst could be recycled at least eight times without significant loss of its activity.

Title: Carboxymethyl cellulose hydrogel loaded with titanium oxide nanoparticles for wastewater treatment

Authors: Hany M. Abd El-Lateef , Mai M. Khalaf, M. Gouda

US Patent No. :No. US 12,434,987B1

Abstract

A carboxymethyl cellulose hydrogel loaded with TiO_2 nanoparticles for wastewater treatment is provided. The TiO_2NPs@CMC hydrogel is made by a method including providing raw date fiber, bleaching the raw date fiber, delignifying the bleached raw date fiber, and then performing alkalization and etherification on the bleached raw date fiber to produce date derived CMC; followed by dissolving the CMC in calcium chloride to form a paste-like solution, adding TiO_2NPs to the paste-like solution, and freeze-drying the paste-like solution to obtain the TiO_2NPs@CMC hydrogel. The TiO_2NPs@CMC hydrogel is effective for degrading pathogens contaminating wastewater and preventing biofilm formation in wastewater systems.

Title: Ferric oxide nanoparticles for wastewater disinfection

Authors: Mai M. Khalaf, Hany M. Abd El-Lateef, M. Gouda, Fatima E. Al Rasheed

US Patent: No. US12371344B1

Abstract

A method of making a ferric oxide (Fe_2O_3) nanoparticle (NP) composition including providing *Rosa rugosa* cv. *plena* (RP) extract; adding the RP extract to a solution of $FeCl_3$ to obtain RP-Fe_3Cl_4; and activating phytochemical compounds in the RP extract to obtain a phyto-synthesized RP-Fe_2O_3 NP composition.

Title: Wound Dressing Based on Polymeric mixture of Cellulose Acetate and Hyaluronic Acid Embedded with Copper Oxide and Magnesium Oxide Nanoparticles

Authors: Mohamed Gouda and Hany M. Abdel-Lateef

Patent No.: US 12,246,099 B1

Abstract

Wound dressings fabricated from a polymeric mixture of cellulose acetate and hyaluronic acid embedded with copper oxide and/or magnesium oxide nanoparticles and a method of making the wound dressing. The method includes combining hyaluronic acid and deionized water to form a first mixture, combining cellulose acetate and acetone to form a second mixture, combining the first and second mixtures to forma third mixture of hyaluronic acid, cellulose acetate, deionized water and acetone, separately adding at least one of a copper acetate solution and a magnesium chloride solution to the third mixture to form a fourth mixture, adding sodium hydride to the fourth mixture to form a final mixture, and drying the final mixture to form a film used for the wound dressing. Different weights of copper oxide and magnesium oxide can be chosen to achieve a certain morphological appearance. The wound dressing is a promising option for wound healing.

Title: Synergistic Enhancement of Capacitance and Catalysis by Cobalt Binary Ligand Complexes on Porous Carbon and Nanosilica

Journal: Catal. Sci. Technol., 2026,16, 402-424

Authors: Waleed A. Aljamhi, Hassan H. Hammud, Nazish Parveen, Sajid Ali Ansari, Javed Mazher

Abstract

Three novel cobalt-based complexes $Co(HBTC)_{0.5}$(4,4'-bipy)Cl (1), $Co(HBTC)_{0.5}$(4,4'-bipy)Cl/PC (1/PC), and $Co(HBTC)_{0.5}$(4,4'-bipy)Cl/NS (1/NS) were prepared with porous carbon (PC) and nano silica (NS) to enhance catalytic and energy storage durability and reusability. (1)/PC exhibited outstanding catalytic efficiency in methyl orange (MO) reduction, maintaining over 119 cycles with TON of 38.2 mg MO/mg catalyst. Conversely, (1) showcased superior reduction capacity for methylene blue (MB), sustaining 41 cycles with TON of 12.96 mg MB/mg catalyst Structural analysis revealed that (1) exhibits high crystallinity, whereas the incorporation of PC and NS results in diminished diffraction intensities. Raman spectroscopy identified carboxylate bonds, while XPS confirmed the presence of Co(II) oxidation states. Thermal analysis indicated a gradual ligand loss, influencing framework robustness. The (1)/PC electrode exhibited outstanding electrochemical behavior in 2 M KOH, delivering a high specific capacitance of 856.4 F g^{-1} at 1 Ag^{-1} and retaining 88.84% of its initial capacitance after 3300 cycles. Cyclic voltammetry confirmed faradaic charge-storage contributions, while charge-discharge analysis indicated rapid ion diffusion and better surface area. These features, arising from the synergistic integration of porous carbon with abundant electroactive sites, highlight (1)/PC as a promising candidate for advanced supercapacitor applications. This study establishes (1)/PC as a promising multifunctional material for both environmental remediation and advanced energy storage, paving the way for future applications in sustainable technologies.

ملخص ملصقات قسم الفزياء

Title: Influence of boundary condition variations on magnetohydrodynamics natural convection and entropy generation in a ternary nanofluid filled-square cavity with elliptic cylinder
Journal: Physics of Fluids 37, 042009 (2025).
Authors: Basma Souayeh

Abstract:

The present study numerically investigates the effects of three distinct boundary condition configurations on inclined magnetohydrodynamics natural convection flow and entropy generation within a square cavity containing a trihybrid nanofluid. The flow is induced by an isothermally heated internal elliptic cylinder, while the cavity is filled with a trihybrid nanofluid composed of multiwall carbon nanotubes (MWCNT), titanium oxide (TiO2), and ferric oxide (Fe2O3) suspended in ethylene glycol. The enclosure is subjected to varying inclination angles and an externally applied magnetic field. The numerical simulations are performed using a custom-developed code implemented in the FORTRAN programing language. The computational methodology employed to solve the coupled governing equations of continuity, momentum, energy, and entropy generation along with the corresponding boundary conditions relies on the finite volume method (FVM) and Full Multigrid Acceleration. This study systematically examines various wake parameters, including the inclination angle of the cavity (γ), the orientation of the applied magnetic field (χ), the Hartmann number (Ha), the Rayleigh number (Ra), the volume fraction of the trihybrid nanofluid (ϕ), and three distinct thermal boundary condition configurations within the proposed model. The major findings issued from the impact of these parameters on the fluid flow and heat transfer characteristics reveal that the thermal boundary conditions of the configuration C3 exhibited the best trade-off between heat transfer enhancement and entropy minimization under specific conditions that will be mentioned in the paper. The insights gained from this study provide a deeper understanding of the interplay between thermal boundary conditions, magnetic field orientation, cavity inclination, and trihybrid nanofluid composition, offering valuable guidance for optimizing thermal management systems in engineering and industrial applications.

Title: Enhanced methane sensing with gold nanoparticle-decorated reduced graphene oxide (AuNPs/rGO) nanocomposites
Journal: Sensors and Actuators B: Chemical 439, (2025) 137865.
Authors: Nagih M. Shaalan , Dalia Hamad

Abstract

In this study, a controlled citrate-based reduction process for uniform Au nanoparticles (AuNPs) nucleation on defect-engineered reduced graphene oxide (rGO) to enhance active sites and CH4 interaction was introduced. AuNPs/rGO sensor achieves high sensitivity at low temperatures with superior selectivity to CH4. The AuNPs/rGO nanocomposite was synthesized via a modified Hummer's method, followed by citrate-based reduction, resulting in the effective nucleation of AuNPs on rGO. Comprehensive structural and morphological made by various characterization tools confirmed the successful formation and uniform distribution of AuNPs on rGO sheets. The gas sensing performance was evaluated at various operating temperatures, demonstrating that AuNPs enhance CH4 sensing, and enable detection at a low operating temperature of 150 °C. They facilitate faster response/recovery times of 53 s/21 s and boost selectivity over other gases such as H2 and CO. The improved sensor performance is attributed to the increased active adsorption sites and improved transfer efficiency of the charge due to the presence of AuNPs. The sensor exhibited excellent repeatability, highlighting its potential for practical applications in environmental monitoring and industrial safety. The work suggests that AuNPs/rGO nanocomposites are promising materials for the development of efficient and reliable CH4 gas sensors. The sensor response was evaluated concerning both temperature and humidity variations at an operating temperature of 150 °C. A 1 % Rh variation had the same impact on the sensor response as 52.9 ppm CH_4, while a 1 °C temperature change corresponded to an equivalent response shift of 27.05 ppm CH_4.

Title: Improved Ni3V2O8 supercapacitive performance via urea-driven morphological alteration
Journal: Ceramics International, Volume 51, Issue 10, April 2025, Pages 13430-13442
Authors: Mir Waqas Alam, Ramesh B. Kharade, Ghayah M. Alsulaim, Shrouq H. Aleithan, Shima Sadaf, Rama Krishna Chava, Dong-Kil Shin, Manesh A. Yewale

Abstract

This research explores the hydrothermal synthesis of Ni3V2O8 (NVO) nanoparticles via modifying urea concentrations for evaluating their structural, morphological, and electrochemical characteristics. Urea, functioning as a morphology-directing agent, affects the nucleation and development of NVO by its interaction with Ni2+ and V5+ ions, resulting in customized nanostructures. NVO samples were analyzed by SEM, EDAX, XRD, and XPS to evaluate their structural and elemental composition. The electrochemical performance was assessed using cyclic voltammetry (CV), Galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS), together with supplementary investigations of asymmetric supercapacitors. NVO-1.2MU had the best capacitance (285 F/g), energy density (14.29 Wh/kg), and power density (150 W/kg) among the synthesized materials at 1 mA/cm2. This sample maintained over 85 % of its original columbic efficiency after 10,000 charge-discharge cycles, underscoring its stability and endurance. The findings indicate that urea content significantly influences the electrochemical properties of NVO, establishing the optimized NVO-1.2MU as a promising candidates for next-generation energy storage applications.

Title: Laser-assisted fabrication of new ultrasensitive sensors based on Pd/Graphene/Copper heterogeneous layers for glucose detection
Journal: Applied Surface Science, Volume 706, 15 October 2025, 163588
Authors: Chawki Awada, HassanH. Hammud, Waleed A. Aljamhi, Stefano Boscarino, Antonino Scandurra, Francesco Ruffino

Abstract

In this work, we report for the first time a new Palladium (Pd)/Graphene (GR)/Copper (Cu) electrode fabricated with a new way that consists of pulsed liquid laser ablation (PLAL) and drop casting. Pd nanoparticles fabricated by PLAL were dropped into a single layer of graphene and dried at 80 °C. Pd/GR/Cu electrodes were tested towards the detection of glucose using cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). With both techniques the detection limit was 0.5 mM and the quantification range was between 0.5 mM to 13.0 mM. The sensitivity values were high, 0.245 mA.mM−1.cm−2 by CV and 81.3 Ohm.mM−1.cm−2 by EIS. The findings underscore the potential of this novel Pd/GR/Cu electrode as a highly sensitive and stable non-enzymatic sensor for glucose detection, offering significant advancements in biosensing technology.

T**itle:** Enhanced pH sensing with mesoporous bromophenol blue-encapsulated anatase nanocomposite: High stability and rapid response
Journal: Materialstoday communications, Volume 46, June 2025, 112796
Authors: Shumaila Islam, Shahad Essa Albrikan, Adil Alshoaibi

Abstract

Owing to dynamic range pH sensing, sol-gel-based bromophenol blue encapsulated anatase nanocomposite (BPB-ANC) is synthesized at minimal temperatures of 90 °C. The BPB-ANC revealed thermal stability at ≤ 460 °C, a surface area of around 189 m^2/g, a crack-free structure with 1.5 nm particle size, rofughness around 15 nm, crystallite size around 85 nm, and uniform elemental distribution throughout the surface. The heterogeneous bonding between functional groups and Ti suggested the effective encapsulation of BPB dye species in the anatase nanoparticles (ANPs). The BPB-ANC revealed pKa around 8.3, and a response time of around 0.17 s in basic media (pH 12) without leaching. These outcomes highlight the potential of BPB-ANC for aqueous media sensing in food research, environmental, and biological systems.

Title: Narrowing of lithium niobate band gap by fabricating Ag/MWCNT/LiNbO3 nanocomposites for solar—Driven photocatalysis applications

Journal: Optical Materials, Volume 164, July 2025, 117048

Authors: Chawki Awada, Mohd Al Saleh Alothoum, Marwah Al Ghareeb, Bakhtiar Ul Haq, Adil Alshoaibi, Abdullah Alshehab, Abdullah Aljaafari

Abstract

In this work, we report for the first time the effects of silver nanoparticles (Ag NPs) and Multiwall carbon nanotubes (MWCNT) loading on the structural and optical properties of LiNbO3 (LN). Ag NPs and MWCNT were loaded using hydrothermal synthesis' method of LN. The structural and optical properties of nanocomposites were studied using TEM, XRD, EDX, UV–Vis, Raman, and PL. The incorporation of Ag NPs and MWCNT showed a significant band gap narrowing. The band gap values extracted using Tauc plot equation for pure LN, Ag0.05/LN, Ag0.05/CNT0.01/LN, and Ag0.05/CNT0.05/LN are 3.73, 3.25, 3.15, and 2.85 eV, respectively. A good correlation between PL and band gap values confirmed the synergetic effect between LN and Ag and MWCNT. The photocatalytic activities of Ag/CNT/LN nanocomposites were evaluated towards the photo-degradation of a complex organic dye such as reactive black 5 (RB5) under UV–visible light. The kinetic rate constant k was extracted with the values $3 \times 10{-}3$, $2.5 \times 10{-}3$,$0.83 \times 10{-}3$, and $7.9 \times 10{-}3$ min−1 for LN, Ag0.05/LN, Ag0.05/CNT0.01/LN, and Ag0.05/CNT0.05/LN, respectively. It was confirmed that adding 5 % of Ag NPs and 5 % of MWCNT enhanced the photocatalytic activities of LN nanostructures. The lower values of k for Ag0.05/LN and Ag0.05/CNT0.01/LN compared to LN and Ag0.05/CNT0.05/LN could be due to their large size and low crystallinity. The electronic structures and DOS of the nanocomposites were studied using density functional theory (DFT). The theoretical studies confirmed the narrowing band gap using different structures. The new nanocomposites will open the way for new solar-based applications.

Title: Degradation of hexachlorocyclohexane from soil with steam-activated biochar

Authors: Muhammad Aamir, Faisal Haroon

Patent No.: US12,285,736B1

Abstract

The present subject matter relates to a steam-activated biochar, a method of preparing the steam-activated biochar, and a method of removing hexachlorocyclohexane (HCH) from soil using the steam-activated biochar.

ملخص ملصقات قسم الرياضيات والاحصاء

Title: Advancing crop health with YOLOv11 classification of plant diseases
Authors: Entesar Hamed I. Eliwa & Tarek Abd El-Hafeez
Journal: Neural Computing and Applications 37, 15223–15253 (2025).

Abstract:

This study investigates the potential of deep learning and computer vision for automated plant disease detection and classification. This study presents a novel approach to plant disease detection and classification using a modified YOLOv11 architecture. The methodology incorporates a custom classification head, dynamic validation splitting, and comprehensive evaluation metrics to enhance performance. Leveraging two comprehensive datasets, the "Tomato Leaf Disease Dataset" and the "Plant Disease 2" dataset, we developed and evaluated a robust deep learning model. The "Tomato Leaf Disease Dataset" comprises 23,723 images across 11 classes, encompassing healthy tomato leaves and diseases like bacterial spots and early blight. The "Plant Disease 2" dataset consists of 2,904 images, focusing on diseases in beans, strawberries, and tomatoes, categorized into 12 classes. We meticulously preprocessed and augmented the datasets to enhance model generalization and performance. The deep learning model was rigorously trained and evaluated using key metrics such as accuracy, precision, recall, and F1-score. The model achieved high accuracy (97.88% and 96.90%, respectively) on both datasets. It demonstrated its effectiveness in recognizing a wide range of disease conditions with consistently high precision, recall, and F1 scores across various disease classes. This research underscores the transformative potential of deep learning in plant pathology, offering a rapid and accurate solution for disease identification. The ability to automate disease detection can significantly improve crop management strategies, leading to increased yields and reduced reliance on pesticides. This technology holds promise for enhancing agricultural sustainability and ensuring food security.

Title: New soliton, kink and periodic solutions for fractional space–time coupled Schrödinger equation

Authors: Manal Alharbi, Adel Elmandouh , Mamdouh Elbrolosy

Journal: Alexandria Engineering Journal 114 (2025) 123–135

Abstract:

This work investigates the time–space fractional coupled nonlinear Schrödinger equation. By applying an appropriate wave transformation, this equation is converted into a fourth-order system of ordinary differential equations, equivalent to a Hamiltonian system with two degrees of freedom. The integrability of the Hamiltonian system is examined using Painlevé analysis. We demonstrate that the Hamiltonian system is completely integrable in the Liouville sense in two cases, wherein the Hamilton–Jacobi equation is also separable, and we introduce the non-integrability conditions. The first integrals of motion for the separable cases are provided. Utilizing bifurcation analysis, we depict the phase portrait and subsequently integrate the separable Hamiltonian system and construct new solutions. Some of solutions are illustrated graphically, and it is shown that the wave solutions profiles are sensitive to temporal and spatial fractional derivatives

Title: Dynamical Behavior of Solitary Waves for the Space-Fractional Stochastic Regularized Long Wave Equation via Two Distinct Approaches
Authors: Muneerah Al Nuwairan, Bashayr Almutairi, Anwar Aldhafeeri
Journal: Mathematics 2025, 13(13), 2193

Abstract:

This study investigates the influence of multiplicative noise—modeled by a Wiener process—and spatial-fractional derivatives on the dynamics of the space-fractional stochastic Regularized Long Wave equation. By employing a complete discriminant polynomial system, we derive novel classes of fractional stochastic solutions that capture the complex interplay between stochasticity and nonlocality. Additionally, the variational principle, derived by He's semi-inverse method, is utilized, yielding additional exact solutions that are bright solitons, bright-like solitons, kinky bright solitons, and periodic structures. Graphical analyses are presented to clarify how variations in the fractional order and noise intensity affect essential solution features, such as amplitude, width, and smoothness, offering deeper insight into the behavior of such nonlinear stochastic systems.

الباحثين الاعلى نشرا على مستوى الاقسام

قسم الرياضيات

م	الاسم	عدد النقاط
1	د. حميرة ياسين صابر	80
2	د. سيف الله غبر	53
3	د. معاذ عوض الله	48

قسم علوم الحياة

م	الاسم	عدد النقاط
1	د/ ساجد علي	41
2	د/ رباب سالم حمد	40
3	د/ أشرف خليفة	22

قسم الكيمياء

	الاسم	عدد النقاط
1	أ.د. هانى عبد اللطيف	148
2	د. مى مصطفى خلف	116
3	د. محمد جوده	96

قسم الفيزياء

	الاسم	عدد النقاط
1	د/ مير وقاص	150
2	د/ عادل الشعيبي	120
3	د/ بسمة سويح	65

الباحثين الاعلى نشرا على مستوى الكلية

م	الاسم	مجموع النقاط
1	د/ مير وقاص	150
2	أ.د/ هانى عبد اللطيف	148
3	أ.د/ عادل الشعيبي	120
4	د. مى مصطفى خلف	116
5	أ.د/ محمد جوده	96
6	أ.د/ البدوي عبد العزيز كمون	82
7	د/ حميرة ياسين صابر	80
8	د/ بسمة سويح	65
9	أ.د/ ناجح شعلان	55
10	د/ سيف الله غبر	53

الباحثين الحاصلين على جوائز دولية

الاسم	التخصص	الجهة المانحة	اسم الجائزة	قيمة الجائزة	تاريخ الحصول على الجائزة
أ.د. هاني محمد عبد اللطيف	الكيمياء الفيزيائية	معرض جنيف الدولي للاختراعات	الميدالية الذهبية في معرض جنيف الدولي للاختراعات الحادي والخمسين بسويسرا	ميدالية ذهبية وشهادة تقدير	مارس 2026
د. مي مصطفى خلف	الكيمياء الفيزيائية	معرض جنيف الدولي للاختراعات	الميدالية الفضية في معرض جنيف الدولي للاختراعات الحادي والخمسين بسويسرا	ميدالية فضية وشهادة تقدير	مارس 2026
أ.د. محمد جوده عبدالحليم	الكيمياء العضوية	معرض جنيف الدولي للاختراعات	الميدالية الفضية في معرض جنيف الدولي للاختراعات الحادي والخمسين بسويسرا	ميدالية فضية وشهادة تقدير	مارس 2026
أ.د. محمد جوده عبدالحليم	الكيمياء العضوية	جامعة الملك فيصل	جائز عضو هيئة التدريس المتميز - فرع التميز في البحث العلمى للعام 2025	المركز الأول- درع و شهادة تميز	نوفمبر 2025
أ.د. ناجح شعلان	فيزياء المواد	معرض جنيف الدولي للاختراعات	الميدالية البرونزية في معرض جنيف الدولي للاختراعات الحادي والخمسين بسويسرا	ميدالية برونزية وشهادة تقدير	مارس 2026

نشاط اليوم العلمي

أطروحة في ثلاث دقائق

مسابقة الأطروحة في ثلاث دقائق (MT3)

نبذة عن المسابقة

تعد مسابقة الأطروحة في ثلاث دقائق (MT3®) منافسة أكاديمية عالمية مرموقة، تتحدى طلاب الدراسات العليا لشرح أبحاثهم في 180 ثانية فقط. بدأت هذه المسابقة في جامعة كوينزلاند بأستراليا، وأصبحت اليوم فعالية عالمية تُقام في كبرى الجامعات، بما في ذلك الجامعات السعودية.

نحن فخورون بإطلاق هذه المسابقة لأول مرة على مستوى الكلية. تهدف المسابقة إلى صقل مهارات الطلاب في التواصل والبحث العلمي، من خلال تلخيص رسائل الدكتوراه أو الماجستير المعقدة بأسلوب شيق ومبسط يصل لجمهور غير متخصص.

قوانين المسابقة

***الوقت: مدة العرض 3 دقائق كحد أقصى، وأي تجاوز للوقت يؤدي إلى استبعاد المشارك.**

***الوسائل البصرية: يُسمح باستخدام شريحة عرض واحدة فقط(PowerPoint) ، وتكون ثابتة (بدون حركات انتقالية أو رسوم متحركة).**

***الأدوات المساعدة: يمنع استخدام أي وسائط إلكترونية إضافية (صوت أو فيديو) أو أدوات مادية (أجهزة معملية أو أزياء تنكرية).**

***طريقة العرض: يجب أن يكون العرض شفهياً ومباشراً (يُمنع الإلقاء الشعري أو الغنائي).**

لجنة التحكيم

تتكون لجنة التحكيم عادة من خمسة أعضاء من خلفيات مهنية متنوعة، وليس بالضرورة أن يكونوا جميعاً من الوسط الأكاديمي. الهدف من هذا التنوع هو قياس مدى قدرة الباحث على إيصال فكرته بوضوح وجاذبية لأي مستمع، بغض النظر عن تخصصه.

اعلان المسابقة


KING FAISAL UNIVERSITY
(SCIENCE COLLEGE)
SCIENTIFIC DAY 12
ACADEMIC DEPARTMENTS
3MT
[3-MINUTE THESIS COMPETITION]
A CELEBRATION OF INNOVATION & SCIENTIFIC COMMUNICATION
[INVITATION]
EVENT: 3MT COMPETITION FINAL
DATE: 26TH OF APRIL 2026, 11:00 AM
VENUE: COLLEGE AUDITORIUM, MAIN CAMPUS